

Shorelines & Natural Environment

Introduction

The Shorelines and Natural Environment chapter incorporates the City of Monroe's Shoreline Master Program (SMP) by reference, and summarizes its content. The chapter also describes the environmental systems and conditions that influence Monroe's planning.

This chapter also recognizes that shoreline areas and natural environmental features play a strong role in Monroe, influencing community character and quality of life. Important natural assets include native vegetation, local geography, soils, surface/sub-surface water bodies, and air quality.

Purpose & Relationship to the Growth Management Act (GMA)

This Environment chapter acknowledges the strong emphasis which the Growth Management Act (GMA) places on the protection of the environment and shorelines.

This includes:

- *The goals and policies of the Shoreline Management Act (SMA) are one of the fourteen goals of the Growth Management Act (GMA) (RCW 36.70A.020(14)).*



Figure 9.01 - Monroe's setting is highly prized by residents. This plan includes policies and programs to maintain in-city natural assets. (Image source: Studio Cascade, Inc.)

- *The goals and policies of a shoreline master program for a county or city approved under Chapter 90.58 RCW shall be considered an element of the county or city's comprehensive plan (RCW 36.70A.480).*
- *Counties and cities must adopt development regulations, using best available science, that protect critical areas (RCW 36.70A.060 and RCW 36.70A.172)*

This chapter also presents information to help implement environmental and SMP objectives, as required by the GMA.

Natural Environment

In addition to the previously referenced State planning goal related to shoreline management, the GMA also contains the following goal concerning the environment:



Figure 9.02 - Monroe is located along the Skykomish River near its confluence with the Snohomish River, with significant floodplain areas along both water bodies. Additionally, areas along the shoreline and in upland areas feature poorly-draining soils. (Image source: Studio Cascade, Inc.)

"...protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water." (RCW 36.70A.020(10))

This goal envisions a mutually-supportive relationship between the built and the natural environment.

Moreover, the GMA contains specific requirements for the designation and protection of critical areas. In 2003, the City of Monroe adopted critical areas regulations that were incorporated into the Monroe Municipal Code as Chapter 20.05. These regulations were developed in compliance with RCW 36.70A.172, which requires that the "Best available science"¹ be used in developing such regulations.

¹ As used in this plan, the term "Best available science" refers to data gathered and developed using criteria established by WAC 365-195-905

The City has also adopted a Shoreline Master Program, included in this plan by reference.

Planning Area Profile

Soil Types & Hydrologic Systems

The City of Monroe contains a wide range of soil types and hydrologic systems. In general:

- *The lower valleys, floodplains, and area sloping from the river valley up to the plateau are characterized by a mix of recessional outwash gravel deposits and glacial till.*
- *The outwash deposits are found primarily in the Rivmont Heights/ Old Owen Road vicinity and along the slopes between the river valley and the Robinhood Park/Wagner Lake Plateau.*
- *The alluvium deposits most commonly found underlying most of the City (in the river valley) absorb water at a rapid rate and provide most of the recharge to Monroe's aquifer system.*
- *Glacial till is found on both sides of SR 522 west of the Reformatory and east to the foot of Bald Hill. These are generally compact tills, which are generally impervious and tend to be of poor quality for septic systems.*

There are a number of sites where the underlying surficial geology offers resources for excavation and quarry activity. Along the Skykomish south of the city, these recessional outwash deposits provided a source of sand and gravel for operations by Cadman, Inc. Extraction activity concluded at this site in 2012, and the company is currently implementing a reclamation plan leading to future use of the site as a shoreline park.

Drainage occurs within three sub-basins of the Snohomish River drainage basin:

- *French Creek*
- *Woods Creek*
- *Lower Skykomish River*

French Creek and other drainage ways flow south and west out of the planning area and into the Snohomish River south of Snohomish. Woods

Creek drains southwesterly into the Skykomish River, which joins the Snoqualmie River to form the Snohomish River southwest of the City.

See Figure 9.08: Stormwater Drainage Basins for an illustration of Monroe's drainage conditions.

Critical Areas

The City of Monroe features numerous critical areas, defined by the GMA as wetlands, areas with critical recharge effect on aquifers used for potable water, fish and wildlife habitat conservation areas, frequently flooded areas, and geologically hazardous areas.

Critical areas are located throughout the City, primarily north of US 2, along the Skykomish River and Woods Creek, and along the fringes of the City limits. The center of the City south of US 2 contains relatively few critical areas compared to the remainder of the City. The critical areas regulations include provisions for limited density transfers.

The following sections discuss the significance of specific critical areas and identify their general location within the Monroe planning area.

Wetlands

Wetlands and riparian corridors perform valuable functions within the ecosystem. Clearing of vegetation, grading, filling, draining, and other activities associated with land development may destroy and decrease the ability of the riparian zone to provide drainage, stabilize stream banks, provide wildlife habitat, and filter pollutants from the water. Wetlands receive surface water from the surrounding area and filter pollutants entering these ecosystems by a combination of physical, chemical, and biological processes.

Wetlands also play a major role in flood control. During flooding, rivers and streams overflow their banks and spread out across the floodplain. Wetland soils act like a groundwater reservoir, storing surplus water as groundwater during wet periods and discharging this stored water into streams later to augment base flow. The wetland area also provides habitat and a source of food for wildlife.



Figure 9.03 - The creation of Lake Tye - essentially a stormwater retention facility - enabled extensive development in West Monroe, including the Fryelands industrial parks and neighborhood. (Image source: Studio Cascade, Inc.)

Since the summer of 1989, the City of Monroe has used the National Wetlands Inventory (NWI) produced by the US Fish and Wildlife Services and the Snohomish County Wetlands Inventory Maps to generally highlight the location and application of wetland criteria necessary for land development. In 2001, the City completed an inventory of shorelines as part of an update to the 2008 adopted City of Monroe Shoreline Master Program. In 2004, the City completed a non-shoreline critical areas inventory focusing on wetlands and streams within the City and designated urban growth area resulting in the 2005 City of Monroe Stream and Wetland Inventory Report.

The City of Monroe adopted critical areas regulations in September 2003 with the most current data on stream and wetland areas depicted in the City's 2013 Comprehensive Plan update, provided here as Figure 9.09.

Floodplain Delineation

The Federal Emergency Management Agency (FEMA) conducts flood insurance studies for communities across the nation. In 1983, FEMA published a flood insurance rate map that included the City of Monroe defining areas that are subject to 100 and 500-year floods.

In 2005, FEMA adopted updated flood insurance rate maps for Snohomish County. The 100-year flood has been adopted as the base flood for the purpose of implementing floodplain management regulations. The 500-year flood is employed to indicate additional areas of flood risk in the community.

After the determination of reaches and their respective flood hazard factors, the entire incorporated area of Monroe was divided into zones, each having a specific flood potential or hazard. Figure 9.10: Floodplains and Shoreline Boundary shows the zones and they include:

- *"A" zones include areas inundated by the 100-year flood, but where base flood elevation has not been determined*
- *Zone "AE" include areas inundated by the 100-year flood and where base flood elevations are available*
- *Shaded "X" zones are areas of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods*

The only areas located within the 100-year floodplain are lowlands immediately adjacent to the Skykomish River and Woods Creek and in the area of Lake Tye. The location of Buck Island Park and the City's Skykomish River Centennial Park consume most of the floodplain and help to separate the river, both in distance and elevation, from the downtown.

Improvements in flood protection measures, including dikes, the construction of drainage ditches in the French Creek Drainage District, and construction of a large compensatory storage lake (Lake Tye, in the Currie Road Sub-area to provide flood storage for future development) have reduced potential flood damage to developed areas of the City.

The City of Monroe also participates in the U.S. Federal Emergency Management Community

Rating System (CRS) Program as a part of the National Flood Insurance Program (NFIP). The CRS program is designed to reduce flood losses, aid in accurate insurance ratings, and promote the awareness of flood insurance.

By 1993, the City of Monroe enjoyed the best flood insurance of any city in the state of Washington, achieving a Class 5 rating in the Community Rating System created by FEMA, reducing flood insurance rates by 10 percent for resident flood insurance policy holders. Currently the City of Monroe holds a Class 5 rating in the Community Rating System.

Fish & Wildlife Habitat

Natural vegetation in Monroe originally consisted of vine maple, cedar, and Douglas fir on the floodplain and in valleys with surrounding hillsides covered by more substantial stands of timber. Most of the planning area today is urbanized. Varieties of habitats remain for native animals that include wetlands, riparian forests, and pasture grasslands.

Typical wildlife species found in the area include high concentrations of wintering raptors associated with the abundance of wintering waterfowl and small mammals in the agricultural areas. Federal threatened and state-sensitive species, the bald eagle and the peregrine falcon, winter along the Skykomish River. There are breeding grounds for the bald eagle and two roosts for Vaux's Swifts within the City of Monroe, according to the Washington State Department of Fish and Wildlife.

Many species of waterfowl use open water in the wetlands and areas adjacent to the Skykomish River for migratory stops, nesting, feeding, and breeding. Pasture-lands are commonly used as feeding areas by gulls and waterfowl and are also used as hunting areas for raptors and other predatory birds.

Game animals including both black-tailed deer and black bear can be found in the rural and forested areas surrounding Monroe. Small fur animals commonly found in the area include red fox, opossum, and skunk. Along the waterways beaver, otter, raccoon, and muskrat are not uncommon. The more extensive outcrops and increasing elevations provide good habitat for grouse, cottontail rabbit, and pheasant.

According to the *Shoreline Master Program Inventory for the City of Monroe's Shorelines*, the Skykomish River and its major tributaries including Woods Creek provide spawning grounds for several types of anadromous fish including coho salmon, chinook salmon, chum salmon, pink salmon, steelhead trout, coastal cutthroat trout, bull trout, and dolly varden trout. Chinook salmon, steelhead trout, and bull trout are listed species under the Federal Endangered Species Act (ESA). In June 2000, the National Marine Fisheries Service (NMFS) adopted a Section 4(d) Rule prohibiting "take"² of Chinook salmon. The U.S. Fish and Wildlife Service (USFWS) also prohibited take of bull trout at the time of its listing.

The City is pursuing additional actions to comply with the no "take" requirement of the Endangered Species Act. The City has been a member of the Snohomish Basin Salmon Recovery Forum since 1994. The mission of the Forum is to:

"...protect, restore, and enhance the productivity and diversity of all wild salmon stocks in the Snohomish River basin to a level that will sustain fisheries and non-consumptive salmon-related cultural and ecological values."

The Forum adopted the Final Salmon Conservation Plan in June 2005.

The City is also participating in a Regional Forum Program for the review and approval of the best management practices for road and ditch maintenance by the federal resource agencies. The United States Department of Commerce National Oceanic and Atmospheric Administration (NOAA) approved the City's Routine Road Maintenance program in 2004. The program is consistent with the Endangered Species 4(d) criteria and will adequately conserve listed species.

In 2008, the National Marine Fisheries Service (NMFS) issued a Biological Opinion that determined that the Federal Emergency Management Agency's (FEMA), National Flood Insurance Program (NFIP) causes jeopardy to several species protected under the Endangered

² In this context, the work "take" is defined in the ESA as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (ESA section 3(18)). The ESA also defines the terms "harass" and "harm" in clarifying prohibited activities.



Figure 9.04 - Monroe's shoreline designations include multiple categories, creating a framework for appropriate uses and policy measures protecting shoreline resources. (Image source: Studio Cascade, Inc.)

Species Act (ESA) including Puget Sound salmon and orca whales. In its Biological Opinion, NMFS provided a Reasonable and Prudent Alternative to modify the implementation of the NFIP in a manner that would remove the jeopardy situation.

In order for the City to remain a member of the NFIP, it had to demonstrate to the FEMA how it planned to comply with the Reasonable and Prudent Alternative contained within the biological opinion. In 2011, the City of Monroe chose to implement Option #3 (permit-by-permit demonstration of compliance) of the NFIP/NMFS Biological Opinion.

Geologically Hazardous Areas

Geologically hazardous areas include areas susceptible to erosion, sliding, earthquake, or other geologic events. They pose a threat to the health and safety of citizens when incompatible

development is sited in areas of significant hazard. Geologically hazardous areas include lands susceptible to erosion, landslide, or other geologic events including mass wasting, debris flows, rock falls, and differential settlement as shown in Figure 9.11: Steep Slopes & Seismic Hazards.

Erosion hazard areas include areas identified by the US Department of Agriculture's Natural Resources Conservation Service as having "severe" or "very severe" rill and inter-rill³ erosion hazards. Landslide hazard areas are those potentially subject to landslides based on a combination of geological, topographical, and hydrological factors.

Areas with all three of the following characteristics are also landslide hazard areas:

- *Slopes steeper than fifteen percent*
- *Hillsides intersecting geological contacts with a relatively permeable sediment overlaying a relatively impermeable sediment or bedrock*
- *Springs or ground water seepage.*

Seismic hazard areas are subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, soil liquefaction, lateral spreading, or surface failure. The strength of the ground shaking is primarily affected by:

- *Magnitude*
- *Distance from the source of an earthquake*
- *Type and thickness of geological materials at the surface, and of the subsurface geological structure*

The greatest areas of geological hazard to development are generally north of Woods Creek Road from Oak Street to the City limits. Most of the area south of US 2 is classified as Site class D-E under the National Earthquake Hazard Reduction Program (NEHRP). Topographic analysis indicates that approximately 222 acres of land in the City are constrained by slopes of 15 to 40 percent gradient, and 56 acres of land are in slopes of 40 percent gradient or greater.

³ *Rill erosion occurs when development of a concentrated flow of water in a very small channel that begins to cut into the soil surface producing a rill. Interrill erosion is caused by the impact of rain on the surface.*

Critical Aquifer Recharge Areas

Groundwater resources found in and around the City of Monroe consist of layers of discontinuous aquifers surrounded by zones of lower permeable sediments. This pattern was created by the advance and retreat of four glacial periods that shaped the surface of the land by depositing coarse sands and gravels throughout the region. These layers provided the structure for many of today's aquifers. Other types of deposits left by the glaciers created silt and clay layers that impede water movement.

Groundwater is recharged by rain falling on the surface of the land. Rainfall can either:

- *Evaporate back into the atmosphere*
- *Run off into adjacent water bodies*
- *Infiltrate downward until a zone of saturation is reached*

In the Monroe area, this zone is often less than five feet deep due to layers of lower permeability such as glacial till or silt and clay deposits. Generally, the low permeability of these deposits is still high enough to allow most of the infiltrated water to continue downward.

Much of the lowland/valley portions of the City are characterized by soils having moderate infiltration rates (reference Figure 9.12: Aquifer Sensitivity). An equally sizeable part of the planning area along the north and west edges contains soils with slow infiltration rates. These soils consist of a layer that impedes the downward movement of water. Surface water runoff potential is high in these areas, and potential drainage problems should be addressed in the determination of development densities or potential.

In analyzing water-bearing characteristics and the occurrence of ground water in the planning area, three major geological types are present:

- *Glacial till*
- *Recessional outwash*
- *Younger alluvium*

Glacial till rates poorly as aquifer material and sheds off a large part of annual precipitation. Groundwater bodies in the recessional outwash deposits are recharged by downward percolation of precipitation. Water in these areas either

emerges as surface drainage or enters adjacent earth materials. Younger alluvium deposits, which cover most of the valley floor, contain groundwater bodies in their permeable layers that act as recharge areas, accumulating water from precipitation, as well as infiltration from runoff and from the Skykomish River and Woods Creek during high water.

The GMA requires the City to regulate critical aquifer recharge areas with critical recharging effect on aquifers used for potable water. Although the City no longer relies on wells for municipal water, the Washington State Department of Ecology (DOE) well logs identify several wells in the Milwaukee Hill area. At this time, it is unknown where critical aquifer recharge areas, if any, exist within the City of Monroe.

Soils

Soils throughout the City have differing characteristics.

Soils within the Downtown Monroe area have been largely disturbed over time and presently support urban intensity land uses. The downtown is settled on ancient sediments of the Skykomish River that are very deep, moderately well drained and nearly level.

Soils within the area generally north of Highway 522 and south of US 2 are generally poorly drained and characterized by severe septic tank limitations given the hazards of seasonal soil saturation. Runoff is typically slow due to the level topography; the hazard of water erosion is minimal.

Soils generally north of Woods Creek Road and east of US 2 Bypass ROW are moderately well drained soils formed on glacial till. The till acts as a hardpan to inhibit infiltration, creating perched water tables, particularly during the wet season. This seasonally high water table affects both the vegetation cover as well as building construction, septic systems and proper drainage for homes. Septic systems may have a high failure rate or function improperly during seasonally wet periods. Reference Figure 9.13: Soils Map for additional information on soils in Monroe.

Natural Hazards Mitigation Plan

In 2003, the City of Monroe joined in the drafting of a Natural Hazards Mitigation Plan for Snohomish County in compliance with the federal Disaster Mitigation Act (DMA) of 2000. The DMA was enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance and emphasizes planning for disasters before they occur.

The City of Monroe adopted the Snohomish County Natural Hazards Mitigation Plan as a standalone document in 2005. As required by the DMA, the mitigation plan was updated and adopted by the City of Monroe in 2010 and updated again in 2015.

Shoreline Master Program (SMP) Overview

Purpose

The City of Monroe has an adopted Shoreline Master Program (SMP) to comply with the requirements of the Shoreline Management Act (SMA, RCW 90.58).⁴

The purposes of the Monroe Shoreline Master Program are:

- *To carry out the responsibilities assigned to the City of Monroe by the Washington State Shoreline Management Act (RCW 90.58)*
- *To promote the public health, safety, and general welfare by providing a guide to regulations for the future development of the shoreline resources of the City of Monroe*
- *To further, by adoption, the policies of RCW 90.58, and the goals of the Master Program, both described in the SMP document.*

⁴ The City's adopted SMP is available on the City of Monroe website at www.monroewa.gov

Applicability

The Washington State SMA applies to "Shorelines of the State" which consist of the following water bodies and adjacent shorelands typically within 200 feet of the water body:

- *All marine waters*
- *Segments of streams where the mean annual flow is more than 20 cubic feet per second*
- *Lakes and reservoirs 20 acres and greater in area*
- *Associated wetlands*

There are two types of "shorelines of the state" which are:

- *"Shorelines of Statewide Significance"*
- *"Shorelines"*

Shorelines of Statewide Significance are larger water bodies meeting certain criteria. Because they have Statewide Significance, the SMA affords them special consideration. Preferred uses for Shorelines of Statewide Significance, in order of priority, are to:

- 1) *Recognize and protect the state wide interest over local interest;*
- 2) *Preserve the natural character of the shoreline;*
- 3) *Result in long term over short term benefit;*
- 4) *Protect the resources and ecology of the shoreline;*
- 5) *Increase public access to publicly owned shoreline areas; and*
- 6) *Increase recreational opportunities for the public in the shoreline area*

The Skykomish River is a designated Shoreline of Statewide Significance and is subject to requirement for the preferred uses.

Other Shorelines of the State which are not Shorelines of Statewide Significance are called Shorelines. Shorelines are smaller water bodies. Woods Creek and Lake Tye (a man-made stormwater facility which was determined to be subject to shoreline management jurisdiction by Department of Ecology in 2007) are shorelines subject to SMA requirements.

Permitted uses along Shorelines of the State shall be designated and conducted in a manner to minimize any damage to the ecology and environment of the shoreline areas, and any interference with the public's use of the water.

Shoreline Environment Designations

Monroe's SMP maps define multiple environmental designations for shoreline areas, creating a framework by which context-appropriate uses and policies may be applied. Criteria for assigning a specific designation to a particular section of shoreline are outlined in the DOE's SMP Guidelines, WAC 173-26-211(5).

The most important differences between the City's environment designations and the criteria provided in the WAC are:

- *The absence of a "Rural Residential" environment*
- *The inclusion of "Tye Stormwater Facility" environment*

Monroe is located within an Urban Growth Area under GMA, thereby making a Rural Residential designation inappropriate. The Tye Stormwater Facility shoreline designation reflects the need to address specific characteristics of the Lake Tye stormwater detention pond.

Figure 9.14 illustrates the City's current shoreline environment designations.

Public Access

Shoreline public access may include picnic areas, pathways and trails, floats and docks, promenades, viewing towers, bridges, boat launches, and improved street ending at shorelines. Along Monroe's shorelines, public access is provided primarily at Al Borlin Park, Skykomish River Park and boat launch, Lewis Street Park, Lake Tye Park, and the Cadman Inc. site on the Skykomish River. Figure 9.15 identifies existing and proposed public access opportunities in the City of Monroe's shoreline jurisdiction. Policies regarding public access are included in the SMP.

Shoreline Uses

The SMA establishes policy that preference be given to uses that are unique to or dependent

upon a shoreline location. Shoreline areas, being a limited ecological and economic resource, are the setting for competing uses and ecological protection and restoration activities. The SMP applies the following preferences and priorities in the order listed below when determining allowable uses and resolving use conflicts in all shoreline areas:

- 1) *Reserve appropriate areas for protecting and restoring ecological functions to control pollution and prevent damage to the natural environment and public health*
- 2) *Reserve shoreline areas for water-dependent and associated water-related uses*
- 3) *Reserve shoreline areas for other water-related and water-enjoyment uses that are compatible with ecological protection and restoration objectives*
- 4) *Locate single-family residential uses where they are appropriate and can be developed without significant impact to ecological functions or displacement of water-dependent uses*
- 5) *Limit non-water oriented uses to those locations where the above-described uses are inappropriate or where non water-oriented uses demonstrably contribute to the objectives of the Shoreline Management Act.*

Shoreline Restoration

Activities with adverse affects on the ecological functions and values of the shoreline must mitigate those impacts. This includes restoration opportunities.

Section 173-26-201(2)(f) of the SMP guidelines helps define the targeted outcome of restoration activities:

"Master programs shall include goals and policies that provide for restoration of such impaired ecological functions. These master program provisions shall identify existing policies and programs that contribute to planned restoration goals and identify any additional policies and programs that local government will implement to achieve



Figure 9.05 - With Lake Tye, Monroe is unique in having created a stormwater facility large enough to have been designated as a Shoreline of the State. (Image source: Studio Cascade, Inc.)

its goals. These master program elements regarding restoration should make real and meaningful use of established or funded non-regulatory policies and programs that contribute to restoration of ecological functions, and should appropriately consider the direct or indirect effects of other regulatory or non-regulatory programs under other local, state, and federal laws, as well as any restoration effects that may flow indirectly from shoreline development regulations and mitigation standards."

Policy Overview

The environment related policies and actions listed in Chapter 2. In general, these policies and actions address:



Figure 9.06 - Al Borlin Park is the City's largest park, and features a soft-surface trail network shown here. Additional features are possible, but limited in part by the fact that the park lies entirely within the 100-year floodplain. (Image source: Studio Cascade, Inc.)

- *Embracing Low-Impact Development (LID) techniques where feasible, reducing runoff and the need for mechanical treatment of stormwater flow*

Overall, the policies reflect the importance of shorelines, open spaces, and wetlands. The policies also provide direction for the successful stewardship of the community's natural assets.



- *Supporting growth patterns that optimize land use and reduce the need for additional infrastructure*
- *Designing transportation infrastructure that supports multiple modes of travel and reduces vehicle miles*
- *Improving access to shorelines and open spaces, building Monroe's relationship with natural features and the Skykomish River*

Agency Links

This page is intended to provide users of this document with links to the agencies identified in this chapter. These links are intended for informational purposes only.

Federal Agencies

Federal Emergency Management Agency Flood Insurance:

<http://www.fema.gov/national-flood-insurance-program>

US Army Corps of Engineers Regulatory Permits:

<http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx>

National Marine Fisheries Service:

<http://www.nmfs.noaa.gov/>

State Agencies

Department of Ecology

Shorelines: <http://www.ecy.wa.gov/programs/sea/shorelan.html>

Landslides: <http://www.ecy.wa.gov/programs/sea/landslides/>

Wetlands: <http://www.ecy.wa.gov/programs/sea/wetlands/index.html>

Floods: <http://www.ecy.wa.gov/programs/sea/floods/>

Groundwater protection: <http://www.ecy.wa.gov/programs/wq/grndwtr/>

WA Dept. of Fish and Wildlife:

<http://wdfw.wa.gov/conservation/phs/>

WA Dept. of Natural Resources:

<http://www.dnr.wa.gov/node/51#geologic-maps>

Washington Natural Heritage Program:

<http://www.dnr.wa.gov/natural-heritage-program>

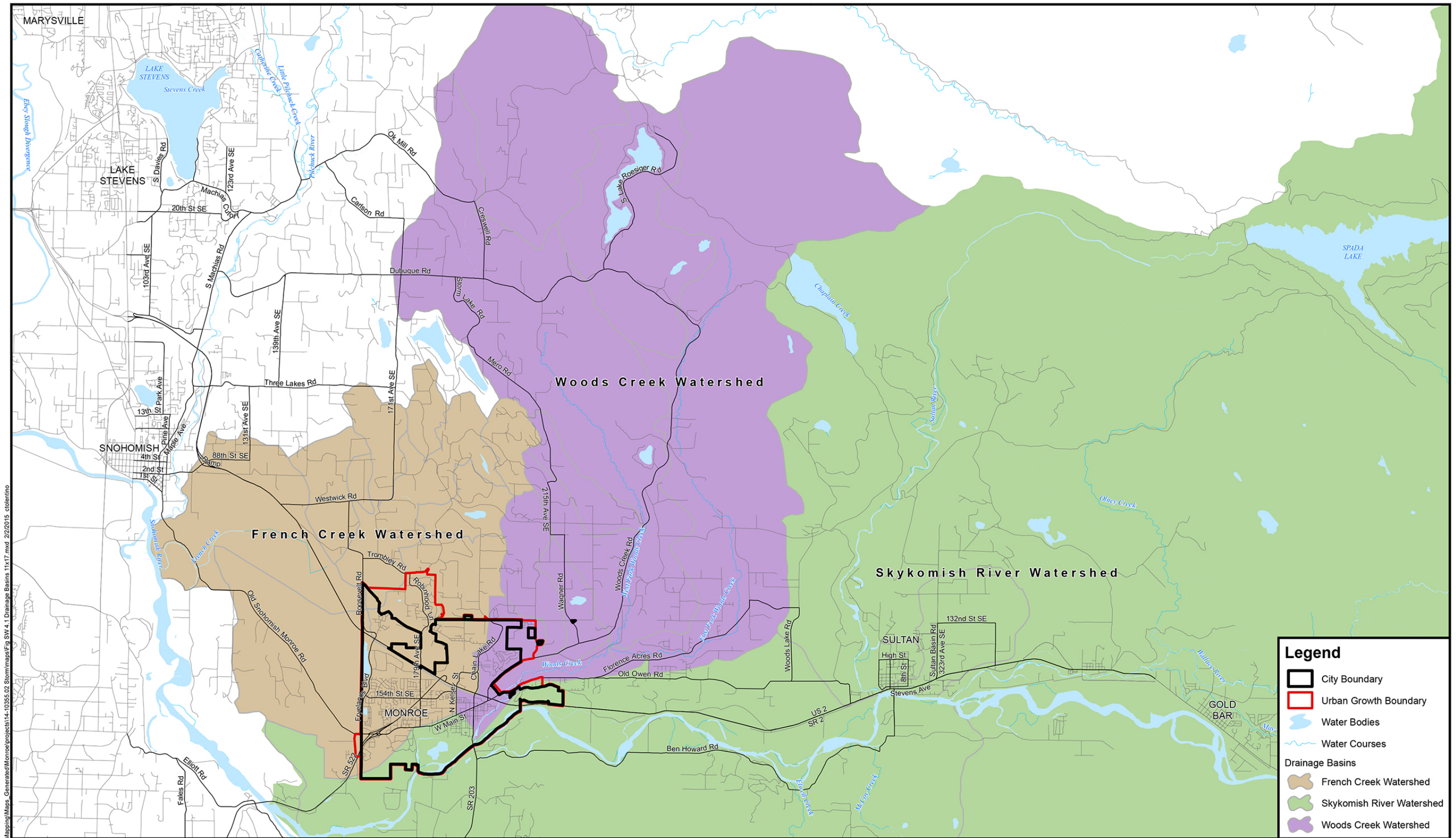
Snohomish County

Snohomish Watershed Salmon Recovery Planning

<http://www.snohomishcountywa.gov/1127/Snohomish-Watershed-Salmon-Recovery-Plan>

Snohomish County Natural Hazards Mitigation Plan

<http://www.snohomishcountywa.gov/2429/Natural-Hazard-Mitigation-Plan>

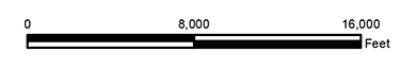


P:\Mapping\Monroe\Generated\Monroe\projects\14-10355-02 Stormwater\Fig. SW 4.1 Drainage Basins 11x17.mxd 2/22/2015 clementino



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Snohomish County base data 2014
Data sources supplied may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.
BHC Consultants LLC, assumes no responsibility for the validity of any information presented herein, nor any responsibility for the use or misuse of the data.



Stormwater Drainage Basins
Utility Systems Plan - Stormwater
City of Monroe, Washington
February 2014

Figure 9.08 - Monroe's Stormwater Drainage Basins Map. (Image source: City of Monroe, 2015 Utility Systems Plan)

City of Monroe



Stream & Wetlands

STREAMS

- Type 1
- Type 3
- Type 3u*
- Type 4
- Type 5
- Unclassified Stream
- Stream Inventory No.

*Unless determined an artificial waterway

BOUNDARIES

- Urban Growth Area
- Monroe City Limits
- Shoreline Boundary

Notes:

- The locations depicted are approximate boundaries for critical areas within the city limits. This map provides only approximate boundaries of known features and is not a substitute for more detailed maps and/or studies to identify the exact locations of known features or additional critical area features not illustrated on the map.
- The points where streams change classification are approximate and subject to confirmation and refinement.
- Classifications are subject to refinement based upon on additional or updated fish use and seasonality of water flow information.



Map data shown is the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction. This map is not an actual survey of individually noted critical areas. Streams have been categorized using the water typing system defined in Monroe Municipal Code Chapter 20.05 (equivalent to WAC 222-16-031). Wetlands were classified using the Washington Department of Ecology's Washington State Wetland Rating system for Western Washington. Wetland size, shape and location are approximate based on a reconnaissance level evaluation. The City of Monroe and the Urban Growth Area may contain additional critical areas not identified on this map. Therefore this map is to be used for reference purposes only.

Source: City of Monroe GIS, 2008;
The Watershed Company;
Snohomish County GIS, 2007

Project: Streams & Wetlands 11x17
Location: Y:\GIS\Departments\CD\Comprehensive Plan\Comp Plan 2013\For_Commerce
Revised: 10-08-13
Author: M. Sartorius

WETLANDS

- Cat I
- Cat II
- Cat III
- Cat IV
- Unclassified Wetlands
- Wetland Inventory No.

BUFFERS*

- Combined Critical Areas Buffers

* Type 4 stream buffer shown as 150 ft on each side of the channel, Type 4 streams, beyond a quarter mile of a stream with salmonids, have a buffer of 75 ft on each side of the channel. See MMC 20.05 for specific buffers.

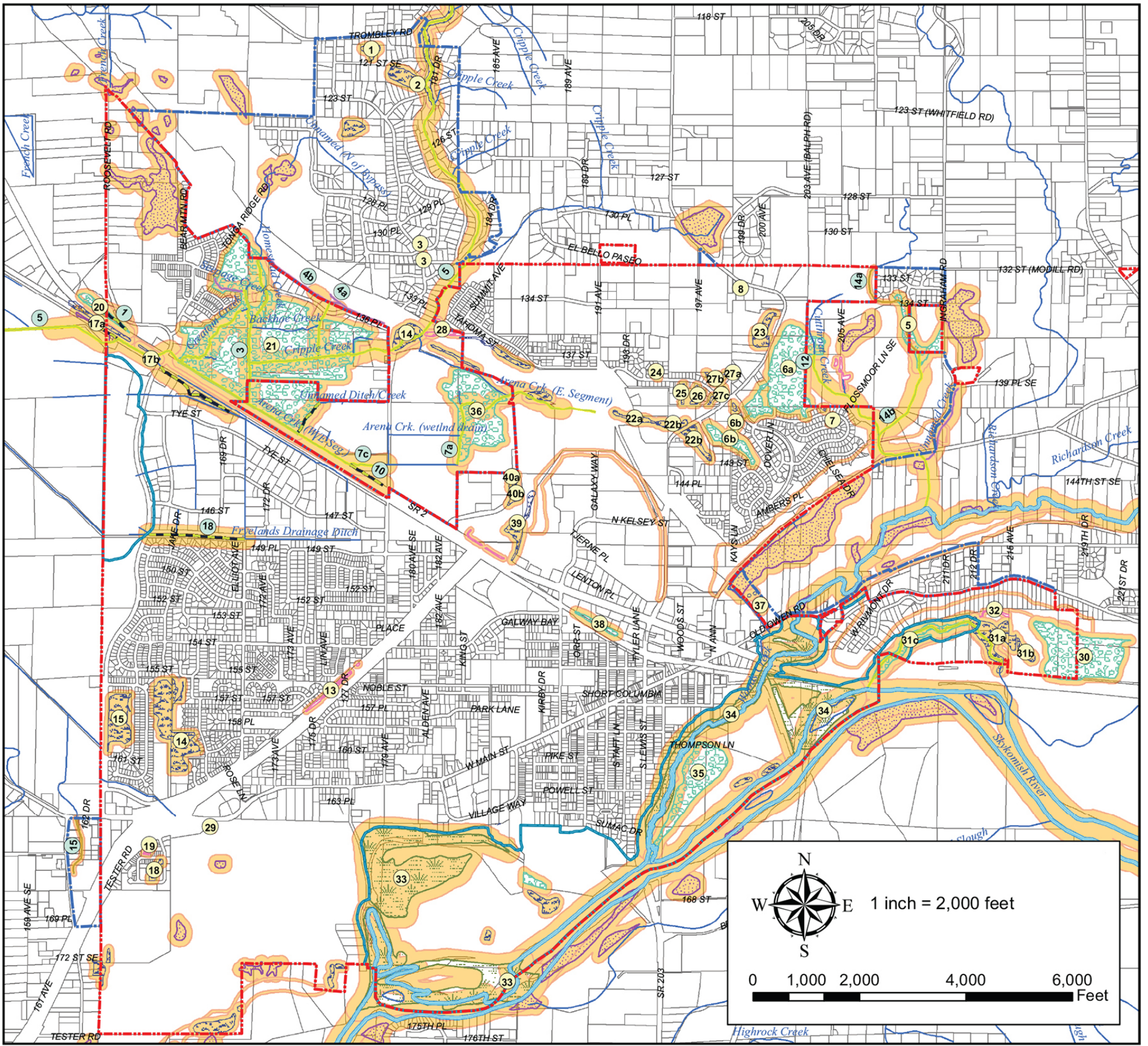


Figure 9.09 - Monroe's Stream and Wetlands map, 2013. (Image source: City of Monroe, 2013 Comprehensive Plan)

City of Monroe



Floodplains & Shoreline Boundary

BOUNDARIES

- Urban Growth Area
- Monroe City Limits
- Shoreline Boundary

Flood Zones

- 100 Yr. Zone A and AE (1999)
- 100 Yr., Zone AE (2005)
- 500 Yr., Shaded Zone X (1999)
- Shaded Zone X (2005) - areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 sq mi; and areas protected by levees from 1% annual chance flood.

- Notes:
- 1) The City of Monroe adopted the 2005 FIRM maps for Panel 1357 of 1575 and the 1999 FIRM maps for Panel 1377 of 1575 resulting in the mapping illustrated herein.
 - 2) The locations depicted are approximate boundaries for critical areas within the city limits. This map provides only approximate boundaries of known features and is not a substitute for more detailed maps and/or studies to identify the exact locations of known features or additional critical area features not illustrated on the map.
 - 3) The points where streams change classification are approximate and subject to confirmation and refinement.
 - 4) Classifications are subject to refinement based upon on additional or updated fish use and seasonality of water flow information.



Map data shown is the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction. This map is not an actual survey of individually noted critical areas. Streams have been categorized using the water typing system defined in Monroe Municipal Code Chapter 20.05 (equivalent to WAC 222-16-031). Wetlands were classified using the Washington Department of Ecology's Washington State Wetland Rating system for Western Washington. Wetland size, shape and location are approximate based on a reconnaissance level evaluation. The City of Monroe and the Urban Growth Area may contain additional critical areas not identified on this map. Therefore this map is to be used for reference purposes only.

Source: FEMA's DFIRM Database, Snohomish County, Washington and Unincorporated Areas, 2005.

Project: Floodplain and Shoreline 11x17
Location: Y:\GIS\Departments\CD\Comprehensive Plan\Comp Plan 2013\For_Commerce
Revised: 10-08-13
Author: M. Sartorius

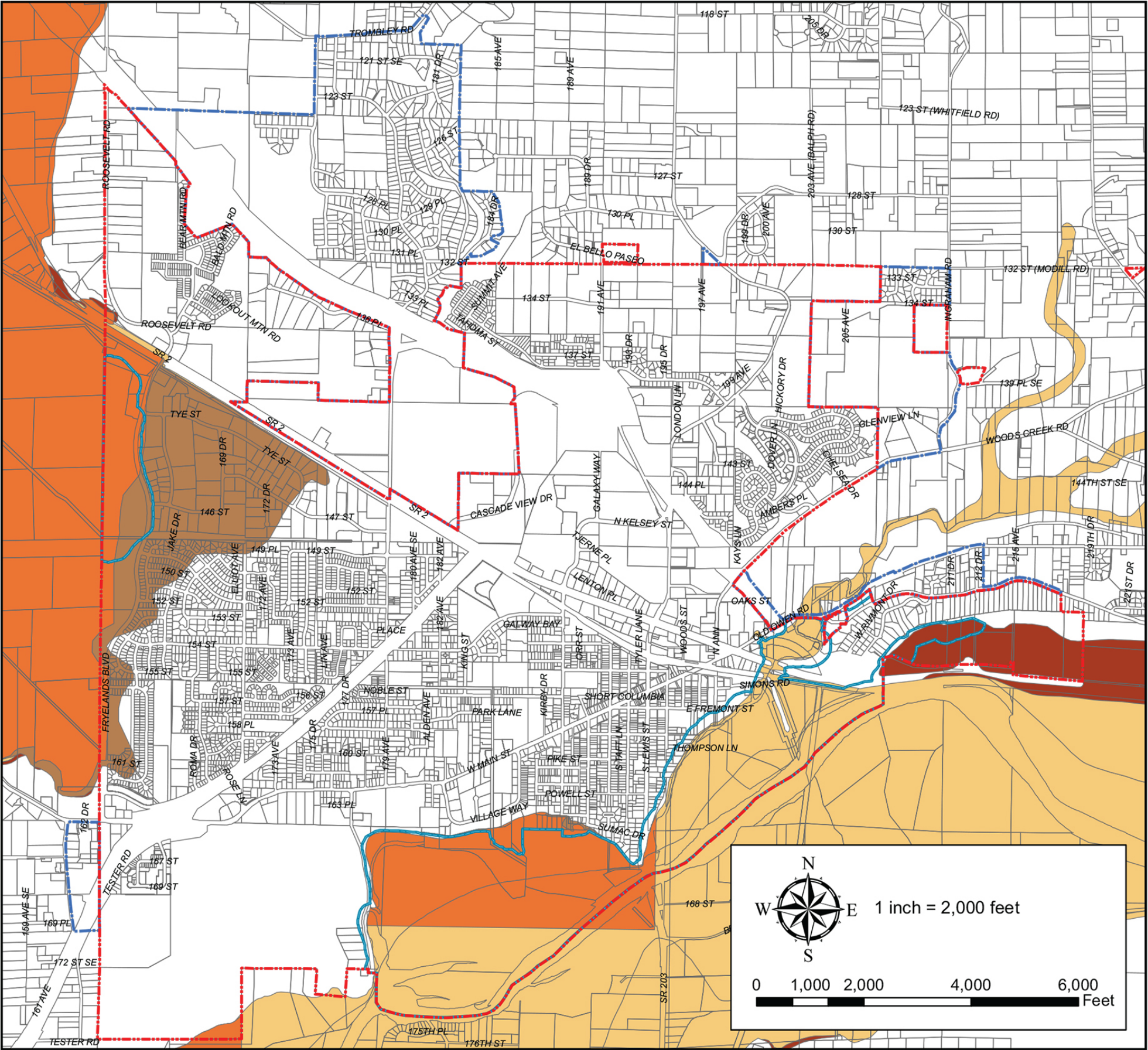


Figure 9.10 - Monroe's Floodplains & Shoreline Boundary map. (Image source: City of Monroe, 2013 Comprehensive Plan)

City of Monroe



Steep Slopes & Seismic Hazards

BOUNDARIES

- Urban Growth Area
- Monroe City Limits

Steep Slopes

- 40% or > slope

Soil Classifications

- B
- B-C
- C
- C-D
- D
- D-E
- E
- F
- ice
- water

Notes:

- The locations depicted are approximate boundaries for critical areas within the city limits. This map provides only approximate boundaries of known features and is not a substitute for more detailed maps and/or studies to identify the exact locations of known features or additional critical area features not illustrated on the map.
- The points where streams change classification are approximate and subject to confirmation and refinement.
- Classifications are subject to refinement based upon on additional or updated fish use and seasonality of water flow information.



Map data shown is the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction. This map is not an actual survey of individually noted critical areas. Streams have been categorized using the water typing system defined in Monroe Municipal Code Chapter 20.05 (equivalent to WAC 222-16-031). Wetlands were classified using the Washington Department of Ecology's Washington State Wetland Rating system for Western Washington. Wetland size, shape and location are approximate based on a reconnaissance level evaluation. The City of Monroe and the Urban Growth Area may contain additional critical areas not identified on this map. Therefore this map is to be used for reference purposes only.

Source: Washington Division of Geology and Earth Resources, Olympia, WA, 2004.
Hazard Mitigation Grant Program Liquefaction Susceptibility and Site Class Maps of Washington State by County. Downloaded from WA DNR GIS FTP site in 2011.

Project: Steep slopes_seismic hazards 11x17
Location: Y:\GIS\Departments\CD\Comprehensive Plan\Comp Plan 2013\For_Commerce
Revised: 10-08-13
Author: M. Sartorius

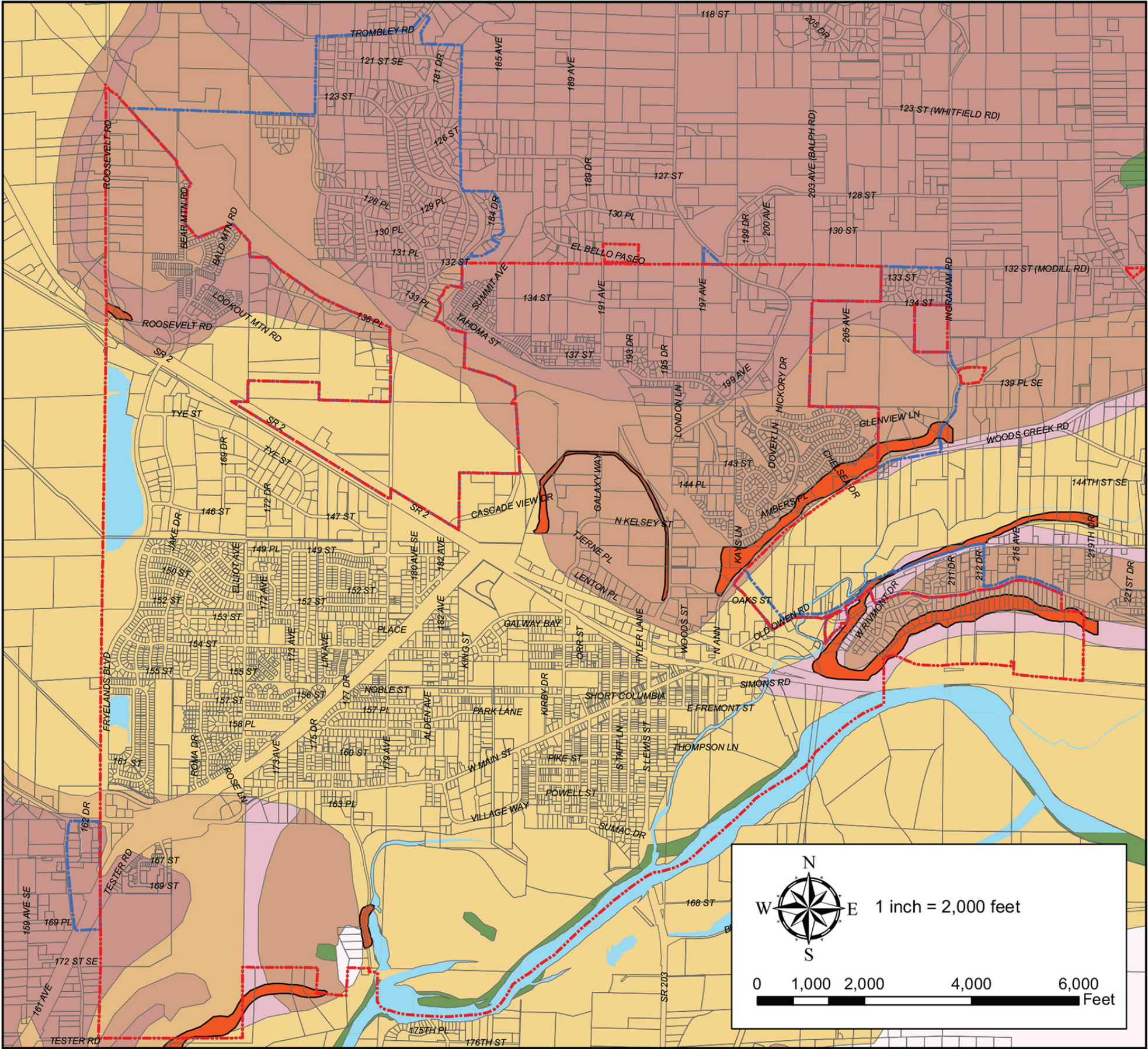


Figure 9.11 - Monroe's Steep Slopes & Seismic Hazards map. (Image source: City of Monroe, 2013 Comprehensive Plan)

City of Monroe



Aquifer Sensitivity

BOUNDARIES

- Urban Growth Area
- Monroe City Limits

Depth to Aquifer

- Low, Over 100ft.
- Moderate, 40 to 100ft.
- High, 0 to 40ft.

Notes:

- 1) The locations depicted are approximate boundaries for critical areas within the city limits. This map provides only approximate boundaries of known features and is not a substitute for more detailed maps and/or studies to identify the exact locations of known features or additional critical area features not illustrated on the map.
- 2) The points where streams change classification are approximate and subject to confirmation and refinement.
- 3) Classifications are subject to refinement based upon on additional or updated fish use and seasonality of water flow information.



Map data shown is the property of the sources listed below. Inaccuracies may exist, and the City of Monroe implies no warranties or guarantees regarding any aspect of data depiction. This map is not an actual survey of individually noted critical areas. Streams have been categorized using the water typing system defined in Monroe Municipal Code Chapter 20.05 (equivalent to WAC 222-16-031). Wetlands were classified using the Washington Department of Ecology's Washington State Wetland Rating system for Western Washington. Wetland size, shape and location are approximate based on a reconnaissance level evaluation. The City of Monroe and the Urban Growth Area may contain additional critical areas not identified on this map. Therefore this map is to be used for reference purposes only.

Source: U.S. Geological Survey "The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington" (1997).

Project: Aquifer Sensitivity 11x17
Location: Y:\GIS\Departments\CD\Comprehensive Plan\Comp Plan 2013\For_Commerce
Revised: 10-08-13
Author: M. Sartorius

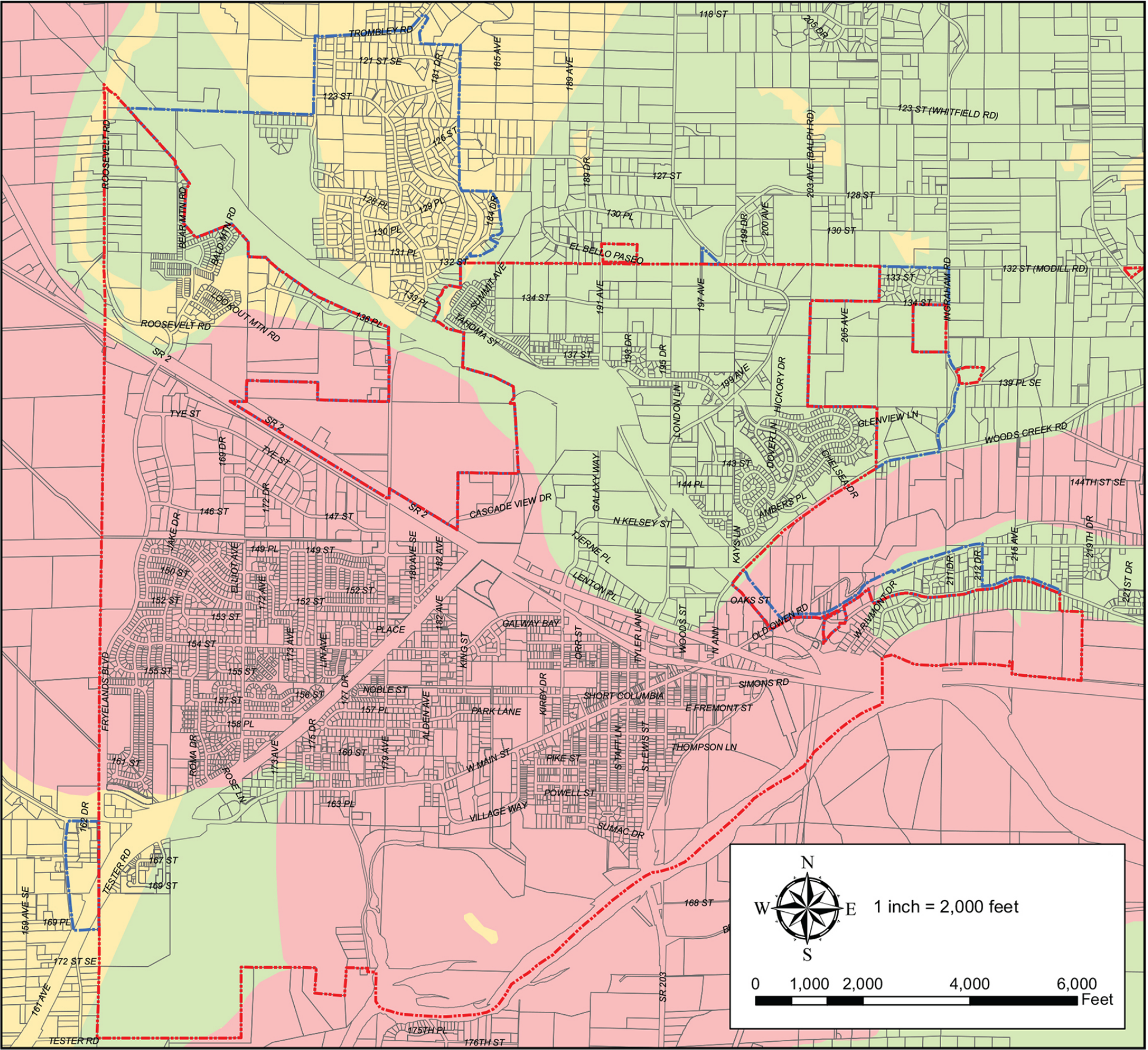


Figure 9.12 - Monroe's Aquifer Sensitivity map. (Image source: City of Monroe, 2013 Comprehensive Plan)

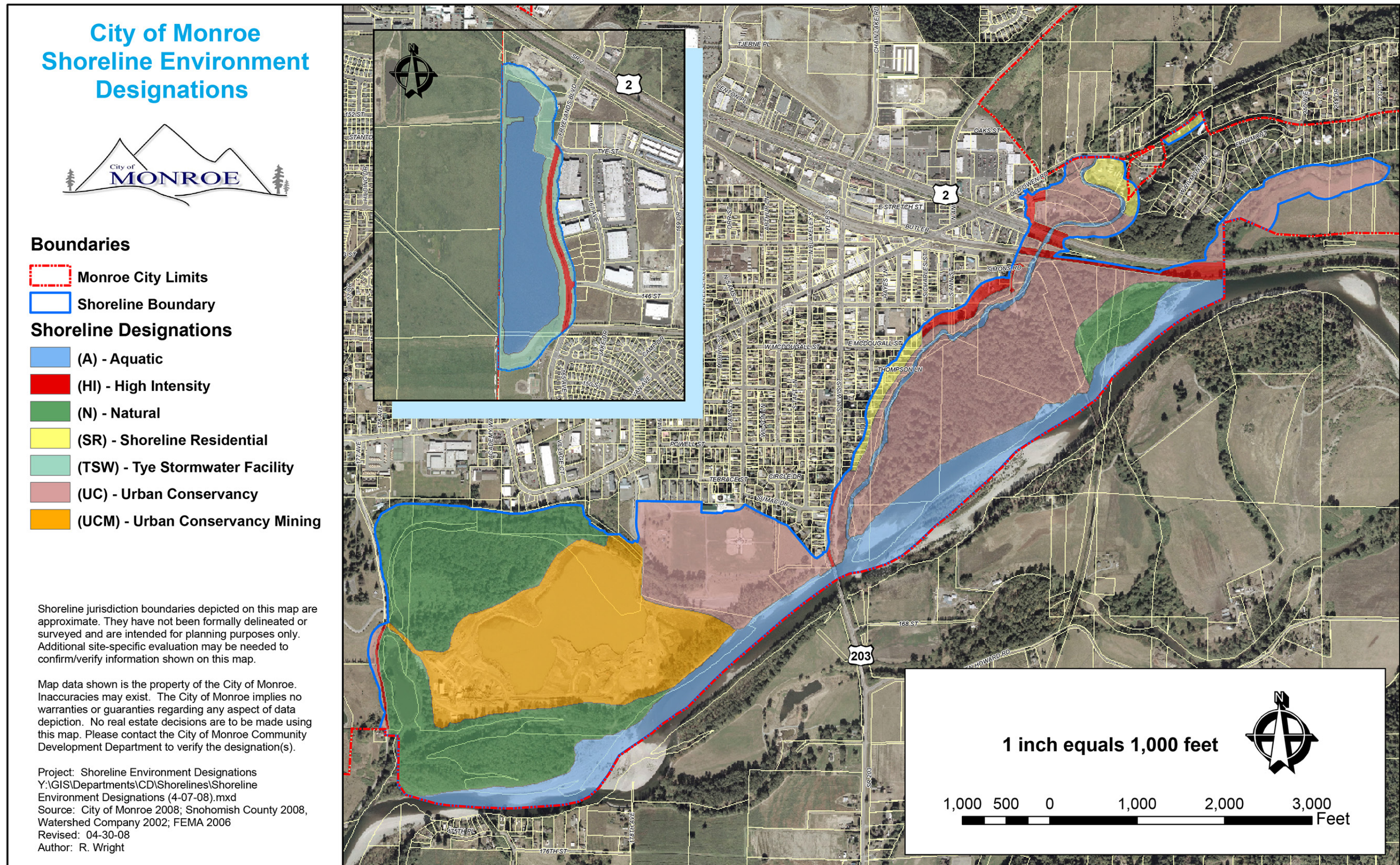


Figure 9.14 - Monroe's Shoreline Environment Designations map. (Image source: City of Monroe, 2008 Shoreline Master Program)

City of Monroe Public Access Map



Boundaries

- Monroe City Limits
- Shoreline Boundary
- City Parks

Public Access Types

- Vehicle
- Boat
- Pedestrian
- Public Access
- Proposed Centennial Trail*

* Final alignment to be determined in the future

Public Properties

- City of Monroe Property
- WA State Property

Shoreline jurisdiction boundaries depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.

Map data shown is the property of the City of Monroe. Inaccuracies may exist. The City of Monroe imply no warranties or guaranties regarding any aspect of data depiction. No real estate decisions are to be made using this map. Please contact the City of Monroe Community Development Department to verify the designation(s).

Project: Shoreline Public Access
Y:\GIS\Departments\CD\Shorelines\Shoreline
Public Access (04-07-08).mxd
Source: City of Monroe 2008; Snohomish County 2008,
Watershed Company 2002, FEMA 2006
Revised: 04-30-08
Author: R. Wright

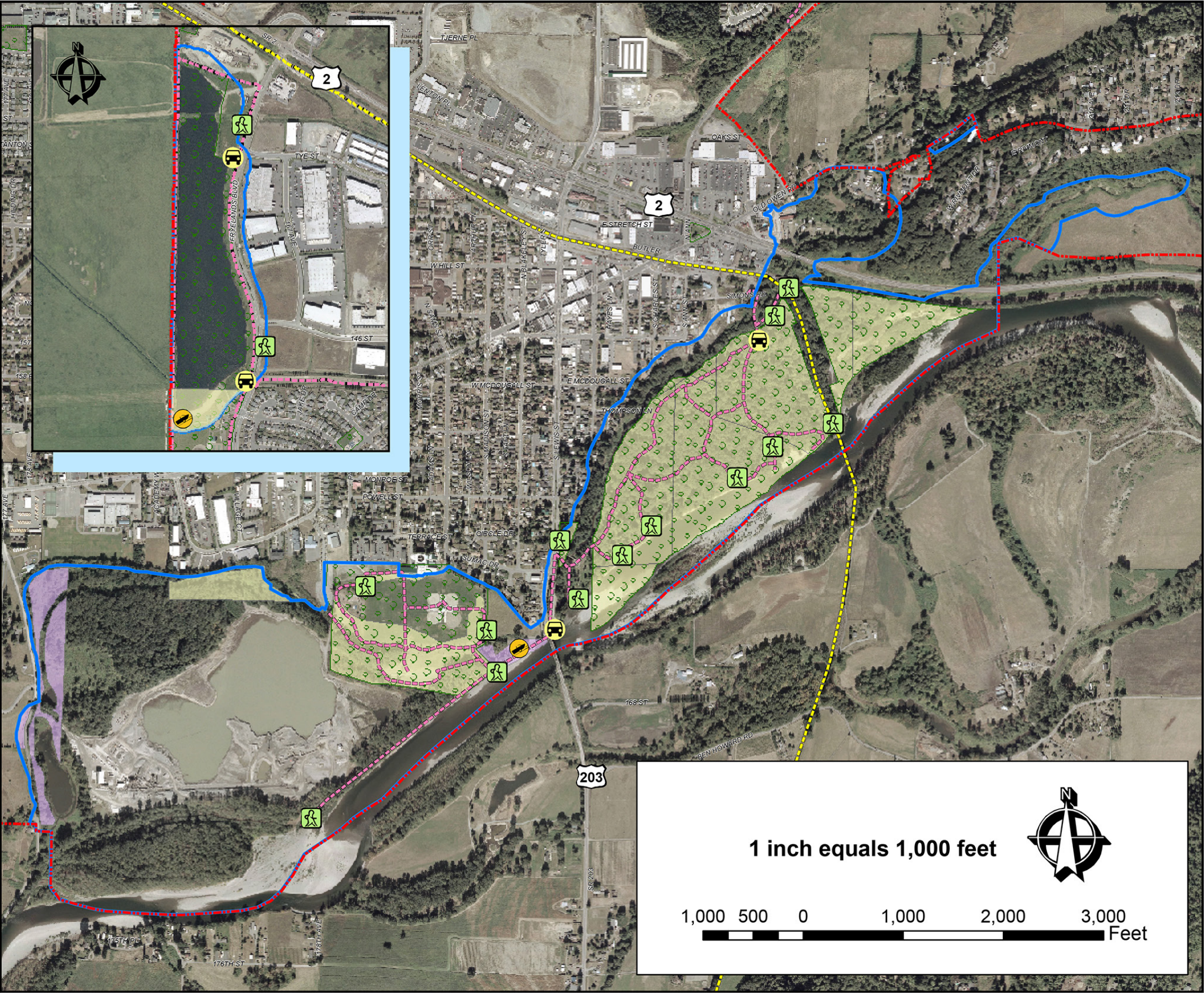


Figure 9.15 - Monroe’s shoreline and public access map. (Image source: City of Monroe, 2008 Shoreline Master Program)